164 increases the overall cost of the camera, connections associated with an external processor (as shown in Figure 2) are eliminated.

Referring to Figure 10, a fourth embodiment of the invention is shown. A camera 172 includes sensor 102, gain control amplifier 106, and A/D converter 108 as described above with respect to Figure 2. Additionally, camera 172 includes a video processing circuit 180 coupled to A/D converter 108 via signal line 174. A digital-to-analog (D/A) converter 182 is coupled to circuit 180 and generates an analog video output signal on output line 184. Processor 114 is coupled to A/D converter 108 using line 176 and coupled to gain control amplifier 106 using communication line 178. The operation of the camera shown in Figure 10 is similar to the operation of the system in Figure 2. Camera 172 differs from camera 100 (Figure 2) by including circuit 180 and D/A converter 182 within the camera such that the camera produces an analog video output signal. Video processing circuit 180 may be capable of performing a variety of different video processing functions, as will be known to those skilled in the art.

From the above description and drawings, it will be understood by those skilled in the art that the particular embodiments shown and described are for purposes of illustration only and are not intended to limit the scope of the invention. Those skilled in the art will recognize that the invention may be embodied in other specific forms without departing from its spirit or essential characteristics. References to details of particular embodiments are not intended to limit the scope of the claims.

CLAIMS

SUB B3

1. A camera comprising:

a sensor configured to capture an image and generate a sensor output signal representing the captured image;

an amplifier coupled to receive the sensor output signal, wherein the amplifier is configured to apply multiple gain levels to the sensor output signal; and

a processor coupled to the amplifier, wherein the processor is configured to provide a control signal to the amplifier to adjust the gain levels applied by the amplifier.

2. The camera of claim 1 wherein the amplifier applies different gain levels to different regions of the captured image.

3. The camera of claim 1 wherein the processor generates a gain map containing gain settings applied to the sensor output signal by the amplifier.

4. The camera of claim 3 wherein the gain map is continually updated by the processor to include changes in the captured image.

5. The camera of claim 3 wherein the gain map is a two dimensional array of gain settings, each gain setting indicating a particular gain applied by the amplifier to a corresponding region of the captured image.

6. The camera of claim 3 further including a register coupled to the processor and the amplifier.

7. The camera of claim 6 wherein the gain map is stored in the register and the amplifier reads the gain settings from the register.

8. The camera of claim 1 wherein the processor provides the control signal to the amplifier in real-time.

9. The camera of claim 1 wherein the processor analyzes the sensor output signal to determine whether a sufficient level of detail is provided in the sensor output signal.

10. The camera of claim 9 wherein the processor increases the gain levels in dark portions of the captured image and the processor decreases the gain levels in bright portions of the captured image.

11. An apparatus for capturing an image, comprising a camera, including:

a sensor configured to capture the image and generate a sensor output signal representing the captured image;

an amplifier coupled to receive the sensor output signal, wherein the amplifier has controls to apply multiple gain levels to the sensor output signal; and

a processor coupled to the camera, wherein the processor is configured to receive the sensor output signal, and wherein the processor is configured to provide a control signal to the amplifier to adjust the gain level applied by the amplifier.

12. The apparatus of claim 11 wherein the processor generates a gain map containing gain settings applied to the sensor output signal by the amplifier.

13. The apparatus of claim 12 wherein the gain map is a two dimensional array of gain settings, each gain setting indicating a particular gain applied by the amplifier to a region of the captured image.

14. The apparatus of claim 13 wherein the processor divides the captured image into a two dimensional array of image regions, each image region associated with a corresponding gain setting in the gain map.

15. The apparatus of claim 12 wherein the camera further includes a register coupled to the processor and the amplifier.

16. The apparatus of claim 15 wherein the gain map is stored in the register and the amplifier reads the gain settings from the register.

17. A method for enhancing the dynamic range of a sensor output signal representing a captured image, the method comprising the steps of:

amplifying the sensor output signal in response to gain settings contained in a gain map, wherein each gain setting is associated with a particular region of the captured image; and

updating the gain settings contained in the gain map in response to changes in the sensor output signal.

18. The method of claim 17 wherein the step of updating the gain settings is performed in response to clipping of the amplified sensor output signal.